

Each bearing pile 13A is fitted with an air-pad casing jack 32 near its top. The casing jack 32 includes a movable sleeve 32a, which is fixed to the supporting tank 3A and can slide on the bearing pile 13A. The movable sleeve 32a is fitted with air pads 32b in the form of bags, which can be inflated with pressurized air to hold the movable sleeve 32a in a predetermined position on the bearing pile 13A. If the bearing piles 13A sink unevenly, the supporting tank 3A inclines. In this case, it is possible to return the supporting tank 3A to its initial position by releasing the air pads 32b once so that this tank 3A can be lifted by its buoyancy, and by then inflating the pads 32b again so that the casing jacks 32 can be held on the bearing piles 13A. This makes it possible to adjust the level of the supporting tank 3A in a short time.

As shown in Fig. 7b, each bearing pile 13A needs to be taller with a supplementary pile 13A' fixed on its top if the supporting tank 3A greatly goes down.

As shown in Fig. 8, the top of every other bearing pile 13A (movable sleeve 32a) is connected to the platform 22 through a pair of dampers 33, which extend outward. Normally, the dampers 33 hold the displacement of the platform 22 at the minimum. When an earthquake occurs, or when an overload is exerted otherwise, the dampers 33 can be released so that no overload can be transmitted to the platform 22.

For a pontoon bridge or the like across a deep valley, it is difficult to set bearing piles as described above. In such a case, the bearing piles may be replaced with tension anchors as shown in Fig. 9.

With reference to Fig. 9, anchors 41 are fixed to the water bottom. A supporting tank 3A is connected to the anchors 41 by chains (or wire ropes) 42. The upper end of each chain 42 is fixed to the supporting tank 3A by a fastener 43.

What is claimed is:

1. An automatic level-control floating apparatus comprising:
 - a fixed casing resting on the water bottom or supported by a support set on the water bottom;
 - the fixed casing having a top open to the atmosphere;
 - the fixed casing filled with liquid;
 - a piston body floating on the liquid in the fixed casing in such a manner that the piston body can move vertically;
 - a floating tank integral with and positioned outside the piston body;
 - the floating tank floating on the water;
 - the floating tank having a top open to the atmosphere;
 - the floating tank filled with liquid;
 - a floating body for supporting the bottom of a superstructure above the water;
 - the floating body floating on the liquid in the floating tank in such a manner that the floating body can move vertically; and
 - a communicating line connecting the interior of the floating tank and the interior of the fixed casing so that the liquid can flow between the tank and the casing;

wherein the level of the floating body can be controlled automatically.

2. An automatic level-control floating apparatus according to Claim 1, wherein the communicating line is formed out of flexible and elastic material.
3. An automatic level-control floating apparatus according to Claim 1 or 2, wherein the ratio of the cross-sectional area of the piston body to the cross-sectional area of the interior of the floating tank is about 1.
4. A structure comprising:
 - a plurality of automatic level-control floating apparatuses according to any one of Claims 1 – 3;
 - the floating apparatuses spaced from each other;
 - a superstructure positioned over the floating apparatuses; and
 - connectors each interposed between the superstructure and the floating body of one of the floating apparatuses;
 - the connectors each allowing the superstructure and the associated floating body to be displaced relative to each other.
5. An automatic level-control floating apparatus according to any one of Claims 1 – 4, wherein the superstructure is a pontoon bridge.
6. An automatic level-control floating apparatus comprising:
 - a support set on the water bottom;
 - an annular fixed casing supported by the support;
 - the fixed casing having a top open to the atmosphere;
 - the fixed casing filled with liquid;
 - an annular piston body floating on the liquid in the fixed casing in such a manner that the piston body can move vertically;
 - a floating tank integral with and positioned within the piston body;
 - the floating tank floating on the water;
 - the floating tank having a top open to the atmosphere;
 - the floating tank filled with liquid;
 - a floating body for supporting the bottom of a superstructure above the water;
 - the floating body floating on the liquid in the floating tank in such a manner that the floating body can move vertically; and
 - a communicating line connecting the interior of the floating tank and the interior of the fixed casing so that the liquid can flow between the tank and the casing;
 - wherein the level of the floating body can be controlled automatically.
7. An automatic level-control floating apparatus according to Claims 6, wherein the superstructure is a floating floor.

8. An automatic level-control floating apparatus according to Claims 6, wherein the support comprises a tension anchor including:
 - an anchor fixed to the water bottom; and
 - a chain or a wire rope connecting the anchor and the fixed casing.